Preventing Gully Erosion in Nigeria

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Stephen Dale

[Photo: In Nigeria, huge gullies can develop in a few weeks or months.]

South-eastern Nigeria is a densely-forested region with a kind of a rolling, hilly terrain. But this lush, green land could soon become an arid badland that's [unsuitable] for cultivation, dangerous for human habitation, and well on the way to becoming a parcel of useless land, warns Frank Simpson, a sedimentologist at the University of Windsor.

The culprit is a phenomenon called 'gully erosion'. Mainly a product of human activities such as deforestation, unsustainable farming practices, path and road construction, and poorly constructed drainage systems, gully erosion takes place when wear-and-tear on the surface land causes rainwater to accumulate in one area, causing loss of vegetation cover, localized erosion, and the formation of gullies. According to Dr Simpson, the problem grows as interconnecting systems of gullies spread across the land surface. The resulting run-off from the hillsides often pollutes the water supply, while landslides threaten villages and highway travellers.

Better engineering

But the phenomenon can be prevented through a combination of better engineering and changes in human behaviour, says Dr Simpson, one of the members of a Nigerian/Canadian research team funded by the International Development Research Centre (IDRC). For almost a decade, the team has been searching for solutions to gully erosion.

The origins of this research project date back to 1990, when Enuvie Akpokodje, a Professor of Geology at Nigeria's University of Port Harcourt, proposed a joint research effort to specialists at the University of Windsor in Canada, where Dr Akpokodje was on sabbatical leave. He and geological engineer Peter Hudec (who has since retired and turned over leadership of the Canadian team to Dr Simpson) submitted a proposal for funding to IDRC. Meanwhile, a similar proposal had been prepared by the late Professor Meshach Umenweke (who died earlier this year) of Nigeria's Nnamdi Azikiwe University, at Awka.

Multi-disciplinary approach

According to Dr Simpson, IDRC was keen to involve both Nigerian institutions in a single venture, believing that a more multi-disciplinary approach would be most effective, and that Dr Akpokodje's perspective as a geological engineer would complement that of Dr Umenweke, who had mapped the geology of much of the threatened region. The scope of the project was further broadened to include botanists, an anthropologist, a sociologist, and an agricultural specialist.

A number of gullies in southeastern Nigeria are caused by the overflow of concrete rainwater gutters at the side of highways, leading to erosion — particularly at the point where the gutter and the road meet — that destabilizes hillsides and undermines roadbeds, says Dr Simpson. The solution to this is largely a matter of engineering: there is a need for better roadside drains that can corral greater volumes of rain.

Outreach campaigns

But other causes of gully erosion are social in nature — and are best addressed through public outreach campaigns that actively involve rural villages, farmers, and herdsmen in the remedy, he adds.

Foot traffic that creates pathways down slopes, for instance, can have disastrous effects. What starts out as a simple pathway through the forest quickly sets the scene for localized erosion by run-off, Dr Simpson explains. In only a matter of weeks, or a few months, where there was previously no gully, there might now be a gully tens of metres or more wide, tens of metres deep, and hundreds of metres long.

Other causes

Driving animals to market or between villages can also have destructive consequences. And cultivating crops can create gullies if the small mounds of soil typically used to trap rainwater for infiltration around the crops are not adequate for the volume of rain.

Dr Simpson views a mixture of innovation and the revival of traditional knowledge as the solution to these problems. Building terraced plots will help ensure that agriculture does not degrade the slope, while the use of soil ridges and spillways can channel rainfall downslope from one terrace to the next in a controlled manner. Footpaths built alongside these terraces can also improve the situation, if they follow the natural contours of the landscape, descending at regular intervals through the use of steps, and possibly employing boardwalks to protect the soil. In addition, erosion can be slowed or halted by harvesting rainwater from the roofs of houses, and restoring the traditional mud and tree-branch barriers, which villagers once constructed to contain rainfall in the forest.

Public education

These measures will not be enacted, however, without a concerted effort to educate the public — something that has already begun. A workshop, which occurred in Imo State in September 1999, when the IDRC-funding was winding down, enjoyed the participation of state politicians, heads of public works, private industry, local erosion committees, and a strong contingent of graduate students and undergraduates who may keep the work alive within academia. Dr Simpson also reports strong media interest in gully erosion, which coincides with the broad public realization — in the aftermath of military rule — that environmental rehabilitation is a key prerequisite for economic growth in Nigeria.

Still, more remains to be done. The researchers have proposed a second-phase project focusing on a specific watershed that will serve as a series of demonstration sites which others may wish to follow. Dr Simpson expresses cautious optimism about the situation, stressing that follow up action must be timely, and the right time is now.

Stephen Dale is an Ottawa-based writer. (Photo: F. Simpson)

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If you have any comments about this article, please contact info@idrc.ca .

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